The processor 20 is connected to a read-only-memory (ROM) 21 for receiving executable instructions as well as certain predefined data and variables. The processor 20 is also connected to a random access memory (RAM) 22 for storing various run-time variables and data arrays, among others. The RAM 22 is sufficient to store user application programs and data. In this instance, the RAM 22 can be provided with a back-up battery to prevent the loss of data even when the computer system is turned off. However, it is generally desirable to have some type of long term storage such as a commercially available miniature hard disk drive, or non-volatile memory such as a programmable ROM such as an electrically erasable programmable ROM, a flash ROM memory in addition to the ROM 21 for data back-up purposes. The RAM 22 stores a database of the spreadsheet of the present invention, among others.

The computer system 10 of the present invention has built-in applications stored in the ROM 21 or downloadable to the RAM 22 which include, among others, an appointment book to keep track of meetings and to-do lists, a phone book to store phone numbers and other contact information, a notepad for simple word processing applications, a world time clock which shows time around the world and city locations on a map, a database for storing user specific data, a stopwatch with an alarm clock and a countdown timer, a calculator for basic computations and financial computations, and a database for storing collected construction data. Additionally, project planning tools, and CAD/CAM systems, Internet browsers, among others, may be added to increase the functionality of portable computing appliances. Users benefit from the software, as the software allow users to be more productive when they travel as well as when they are in their offices.

The computer system of the present invention receives instructions from the user using one or more switches such as push-button switches in a keypad 24. The processor 20 is

also connected to a real-time clock/timer 25 which tracks time. The clock/timer 25 can be a dedicated integrated circuit for tracking the real-time clock data, or alternatively, the clock/timer 25 can be a software clock where time is tracked based on the clock signal clocking the processor 20. In the event that the clock/timer 25 is software-based, it is preferred that the software clock/timer be interrupt driven to minimize the CPU loading. However, even an interrupt-driven software clock/timer 25 requires certain CPU overhead in tracking time. Thus, the real-time clock/timer integrated circuit 25 is preferable where high processing performance is needed. The expansion bus 26 can communicate with the camera 5, which can be a camera with a charge-coupled device (CCD) image sensor or a CMOS-based image sensor.

Additionally, the expansion bus 26 can receive a wireless transceiver 31, which is connected to an antenna 32. The wireless communication device 31 satisfies the need to access electronic mail, paging, mode/facsimile, remote access to home computers and the Internet. One simple form of wireless communication device 31 is an analog cellular telephone link where the user simply accesses a cellular channel similar to the making of a regular voice call. However, the transmission of digital data over an analog cellular telephone network can give rise to data corruption. Digital wireless networks such as cellular digital packet data (CDPD) can be used. CDPD provides data services on a non-interfering basis with existing analog cellular telephone services. In addition to CDPD, a communication service called Personal Communication Services (PCS) allows wireless access into the public service telephone network.

The two-way communication device 31 can also be a two-way pager where the user can receive as well as transmit messages. The two-way communication device supports a Telocator Data Protocol by the Personal Communications Association for forwarding binary

data to mobile computers. The standard facilitates transmission of images and faxes over paging and narrowband PCS networks. Alternatively, the two-way communication device 31 can be substituted with a cellular telephone.

The two-way communication device 31 has a receiver, a transmitter, and a switch, all are controlled by the CPU 20 via the bus of the portable computer system of Figure 1. The switch receives an input from the antenna 32 and appropriately routes the radio signal from the transmitter to the antenna 32, or alternatively, the radio signal from the antenna 32 to the receiver in the event the processor 20 is expecting a message. Via the bus 26, the processor 20 controls the receiver, the transmitter, and the switch to coordinate the transmission and receipt of data packets. The receiver and transmitter are standard two-way paging devices or standard portable cellular communication chips available from Motorola, Inc. in Schaumburg, Illinois or Philips Semiconductors in Sunnyvale, California. The antenna 32 is preferably a loop antenna using flat-strip conductors such as printed circuit board wiring traces as flat strip conductors have lower skin effect loss in the rectangular conductor than that of antennas with round-wire conductors.

The processor 20 of the preferred embodiment accepts handwritings as an input medium from the user. A digitizer 34, a pen 33, and a display LCD panel 35 are provided to capture the handwriting. Preferably, the digitizer 34 has a character input region and a numeral input region which are adapted to capture the user's handwritings on words and numbers, respectively. The LCD panel 35 has a viewing screen exposed along one of the planar sides of the enclosure are provided. The assembly combination of the digitizer 34, the pen 33 and the LCD panel 35 serves as an input/output device. When operating as an output device, the screen 35 displays computer-generated images developed by the CPU 20. The LCD panel 35 also provides visual feedback to the user when one or more application